Comments of Lisa Ledwidge, Institute for Energy and Environmental Research, at the U.S. Department of Energy public hearing on the supplement to the draft Surplus Plutonium Disposition Environmental Impact Statement, June 15, 1999

My name is Lisa Ledwidge. I am the Outreach Coordinator at the Institute for Energy and Environmental Research, a non-profit organization in Takoma Park, Maryland. I coordinate a project that provides technical assistance to grassroots groups around the country on nuclear issues.

I have three questions and a comment for the Department of Energy (DOE) regarding the supplement to the draft Surplus Plutonium Disposition Environmental Impact Statement.

1. When will the DOE grant the public access to the home-country environmental and public and worker health record of Cogema (the French company that is a member of the consortium that DOE contracted for mixed-oxide [MOX] fuel fabrication and irradiation)? The American people have a right to access this information on the same basis that DOE documents would be available to the public here in the U.S. 1

2. Who holds the liability for potential accidents with or failures of the MOX program in Russia? This question has not been addressed in any DOE public document as far as I am aware. However, it is a very important one, given the economic situation in Russia, the questionable safety status of Russian reactors, and the current or potential role of the US in financing or otherwise promoting the joint U.S.-Russian MOX disposition plan. This is an especially important question in light of the fact that the Russian MOX program will use light water reactors, a plan the Russian government is adopting at the urging of the U.S. Minatom (DOE's Russian counterpart) would actually prefer to use breeder reactors. 2

3. How does the DOE justify the militarization of civilian nuclear power plants in which it proposes to irradiate MOX fuel? (By militarization, I refer to the transportation and storage of MOX fuel, made with military plutonium, to and at commercial nuclear power plants. Some may think this too strong a term, but in reality what DOE is proposing to do is locate fuel made with military plutonium at civilian sites.) In addition, what provisions are planned for the significant change in status of civilian nuclear power plants to military or quasi-military sites, since they will at least temporarily be storing unirradiated MOX fuel which can, relatively readily, be converted to weapons-usable material? 3

One final comment. It is beyond my understanding why the DOE would deny, after repeated requests, public hearings in the communities around the North Anna, Catawba and McGuire reactors. The DOE has responded to this with something like, More than 80 hearings have been held on this EIS, and people can comment in other ways. If DOE has held 80 hearings, then why were not a few of them held in reactor communities? Alternatively, if DOE has held 80 hearings, how much trouble could have been three more? 4

I look forward to answers to these questions in the near future. Thank you very much for this opportunity to comment.

DCR016

DCR016–1 **MOX RFP**

DOE considered past environmental performance of COGEMA in awarding the contract for MOX fuel fabrication and irradiation services. The operating experience at MELOX is being factored into the MOX facility design and was used to update information in this SPD EIS as discussed in Appendix P. More information on COGEMA's environmental record can be found on their Web site at http://www.cogema.com or by contacting Ms. Christi A. Byerly. Her address is: 7401 Wisconsin Avenue; Bethesda, MD 20814. She may also be contacted by telephone at (301) 941-8367. Her fax number is (301) 652-5690, and her email address is cbyerly@cogema-inc.com.

DCR016–2 **Nonproliferation**

DOE acknowledges the commentor's concerns regarding the liability for potential accidents or failures of the MOX program in Russia, although programmatic and policy issues such as U.S. policies toward plutonium disposition in Russia are beyond the scope of this SPD EIS. The scope of this SPD EIS is focused on analysis of alternatives on whether and how much U.S. surplus plutonium should be used as MOX fuel, which technology should be used for immobilization, where to construct the proposed surplus plutonium disposition facilities that are needed, and where to perform lead assembly fabrication and testing.

The *Joint Statement of Principles* signed by Presidents Clinton and Yeltsin in September 1998 provide general guidance for achieving the objectives of a future bilateral agreement to disposition surplus plutonium in the United States and Russia. Sensitive negotiations between the two countries have indicated that the Russian government accepts the technology of immobilization for low-concentration, plutonium-bearing materials, but that the MOX approach would be considered for higher-purity feed materials.

Understanding the economic dilemma in Russia, the U.S. Congress has appropriated funding for a series of small-scale tests and demonstrations of plutonium disposition technologies jointly conducted by the United States and Russia. For fiscal year 1999 (starting October 1998), Congress further appropriated funding to assist Russia in design and construction of a plutonium conversion facility and a MOX fuel fabrication facility. This funding would not be expended until the presidents of both countries signed a new agreement. Although the amount appropriated by Congress is not sufficient to fund the entire Russian surplus plutonium disposition program, the United States is working with Russia and other nations to resolve this issue.

Breeder reactors are designed to create plutonium as they burn MOX fuel. The plutonium in the spent fuel is then separated for reuse (reprocessed) as new MOX fuel. Since using MOX fuel in breeder reactors would produce plutonium, DOE believes there are significant nonproliferation concerns regarding the use of breeder reactors for the disposition of surplus weapons-usable plutonium.

DCR016–3 **DOE Policy**

Consistent with the U.S. policy of discouraging the civilian use of plutonium, a MOX facility would be built and operated subject to the following strict conditions: construction would take place at a secure DOE site, it would be owned by the U.S. Government, operations would be limited exclusively to the disposition of surplus plutonium, and the MOX facility would be shut down at the completion of the surplus plutonium disposition program. For reactor irradiation, the NRC license would authorize only the participating reactors to use MOX fuel fabricated from surplus plutonium, and the irradiation would be a once-through cycle with no reprocessing.

In order to address security against terrorist-related incidents, all intersite shipments of weapons-usable plutonium for the surplus plutonium disposition program would be made using DOE's SST/SGT system. This involves having couriers that are armed Federal officers, an armored tractor to protect the crew from attack, and specially designed escort vehicles containing advanced communications equipment and additional couriers. Further, DOE does not anticipate the need for any additional security measures at reactor sites, other than for the additional security applied for the receipt of fresh fuel. Commercial reactors currently have armed security forces, primarily to protect against perimeter intrusion. There would be increased security for the receipt and storage of fresh MOX fuel, as compared with that for fresh LEU fuel, for additional vigilance inside the perimeter. However, the increased security surveillance would be a small increment to the plant's existing security plan. After irradiation, the MOX fuel would be removed from the reactor and managed with the rest of the spent fuel from the reactor, eventually being disposed of at a geologic repository built in accordance with the NWPA.

DCR016–4 **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's concern that DOE has denied repeated requests for public hearings near the proposed reactor sites that would use the MOX fuel. After careful consideration of its public involvement opportunities, including the availability of information and mechanisms to submit comments, DOE decided not to hold additional hearings on the *Supplement to the SPD Draft EIS*. In addition to the public hearing on the *Supplement* held in Washington, D.C., DOE provided other means for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Also, at the invitation of South Carolina State Senator Phil Leventis, DOE attended and participated in a public hearing held on June 24, 1999, in Columbia, South Carolina.

The *Supplement* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. Further, interested parties would likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH
LISA LEDWIDGE
PAGE 1 OF 1

This is Lisa Ledwidge with the Institute for Energy and Environmental Research. My telephone number is (301) 270-5500. I would like to register for the hearing on June 15th. I'm not sure if you need me to say whether I will go to the earlier or the later one. I'll probably go to the 9:00 AM one. Also on a second point, I'd like to leave is a request for more hearings in the areas affected by the Supplemental, including the reactor communities and the transportation corridors. Thank you. 1

PR001

PR001–1 **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's request for additional public hearings in areas affected by the use of MOX fuel, including the reactor and transportation corridor communities. After careful consideration of its public involvement opportunities, including the availability of information and mechanisms to submit comments, DOE decided not to hold additional hearings on the *Supplement to the SPD Draft EIS*. In addition to the public hearing on the *Supplement* held in Washington, D.C., DOE felt there were sufficient other means provided for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Also, at the invitation of South Carolina State Senator Phil Leventis, DOE attended and participated in a public hearing held on June 24, 1999, in Columbia, South Carolina.

The *Supplement* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. Further, interested parties would likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

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ARJUN MAKHIJANI
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INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH

6935 Laurel Avenue, Suite 204
Takoma Park, MD 20912

Phone: (301) 270-5500
FAX: (301) 270-3029
e-mail: ieer@ieer.org
http://www.ieer.org

Comments of the Institute for Energy and Environmental Research (IEER) on the on Supplement to the Surplus Plutonium Disposition Draft Environmental Impact Statement (DOE/EIS-0283-DS, April 1999)
by
Arjun Makhijani
28 June 1998

The Final EIS should include the features described in the comments below.

1. According to various statements of the Department of Energy (DOE) and its contractors, the proposed use of mixed oxide fuel to disposition surplus plutonium from the US nuclear weapons program is based on the experience of the use of MOX in European light water reactors (LWRs). The DOE should explicitly analyze reactor control, cost, and accident-probability and consequence issues with this in mind. It has not done so in the Draft Supplemental EIS. DOE should specify exactly what European experience it is relying on for making its decision on its MOX program, what reactors use MOX in Europe and how they correspond to the proposed reactors in the United States in terms of safety features, control rods, etc. DOE should make this European data public as part of its Final EIS. The DOE should provide a detailed comparison of the reactors of the proposed vendors Duke Power and Virginia Power with the French reactors in which MOX fuel is used in terms of their (i) safety features, (ii) control rod design and quantity as well as other reactor control features; (iii) design aspects related to emergency core cooling and containment of an accident. For instance, unlike some US reactors, the reactors in France's MOX program do not rely on ice condensers as a safety feature. 1

2. If DOE believes that the safety features of US and French and/or other European reactors are materially the same it should so state, and provide the justification for it. If the DOE is relying on French or European reactor safety experience and design features, it should justify this. In that case the DOE should make an explicit commitment that whatever safety issues come up in the in the future in the French or European MOX programs (respectively) would also be addressed in the US disposition program. The DOE should make a commitment to seek approval from the NRC about its assumptions regarding the similarities and differences in the safety and control features of the French reactors relative to the six reactors now proposed to be included in the MOX program as well as any reactors that might be added in the future.

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FR004

FR004–1 **MOX RFP**

The proposed reactor utilities will use existing accident-probability and consequence analysis tools, techniques, and data in the development of their NRC license application amendments. These tools include approved PRA models and modeling techniques. Techniques include the assessment of various failure modes, root cause analysis, site-specific conditions and plant equipment, systems, and components. Data will include appropriate national and international information.

The plant and site-specific information will include the analysis of the "defense in depth" methodologies which provide specific boundaries for the radionuclides. The first boundary is the fuel rod itself. The second is the reactor and steam supply system. The third is the reactor containment vessel. There are several fuel designs, reactor types, and containment types. The "ice condenser" containment is only one type.

European reactors of various designs use MOX fuel. French and Belgian reactors are based on a Westinghouse design, and are similar to the McGuire, Catawba, and North Anna reactors. European nuclear regulatory authorities in France, Germany, Belgium, the Netherlands, and Switzerland have reviewed MOX fuel use in reactors of varying designs.

Before any MOX fuel is used in U.S. reactors, NRC must perform a comprehensive and public safety review and issue a revision to the reactor operating licenses. Under NRC regulations, the utilities would have to provide information in their licensing submittals, which would prove their ability to operate within existing specifications.

INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH
ARJUN MAKHIJANI
PAGE 2 OF 3

3. The Final Supplemental EIS should state that the percentage of plutonium-239 in the core of the reactors proposed to be used in the disposition program will not exceed the typical conditions that have prevailed in the European MOX program and for which there is substantial experience. These levels are about 5 percent total plutonium content (all isotopes), using reactor grade plutonium, which has about 60 percent plutonium-239, a far lower fraction than weapons grade plutonium (about 94 percent). This restriction is necessary for safety reasons, since the proportion of delayed neutrons upon which reactor control depends is much lower for plutonium-239 fission that for uranium-235 fission. The table below shows two examples of how the restriction of equivalent plutonium-239 content in the core reduces the percentage of weapons-grade plutonium that can be used in the MOX fuel of the disposition program. 2

	MOX Core loading fraction, %	Pu-total in MOX, %	Pu-239 core loading, %
Reactor grade MOX, France, typical	30	5.3	1.0
Weapons-grade MOX	30	3.4	1.0
Weapons-grade MOX	40	2.5	1.0

Note: Calculations are based on a plutonium-239 content of 60 percent for reactor-grade plutonium and 94 percent for weapons grade plutonium.

In the first example, for a 30 percent MOX fuel core loading in the disposition program, the weapons-grade plutonium content in MOX fuel would be restricted to 3.4 percent. For forty- percent core loading, it would be restricted to 2.5 percent plutonium. DOE should make these restrictions explicit in its Supplemental EIS. We note that although Electricite de France has asked for authorization to increase the total plutonium enrichment of reactor grade plutonium in MOX to about 7 percent, there is no substantial experience with this. This should not be used as the basis of the US disposition program. It would be contrary to repeated assurances that the US disposition program is based on extensive European experience.

4. The DOE should calculate the schedule and cost implications of the restrictions in the MOX loading and plutonium content as described above. It should specifically analyze at least the two examples in the table above. 3

5. The DOE should provide detailed safety justification for any increase in plutonium-239 content above one percent in the core (see table above). If the DOE's Record of Decision is to proceed with MOX (which IEER opposes), the DOE should require 4

FR004

FR004–2 **MOX RFP**

There is no NRC restriction or limit concerning the amount of plutonium 239 in the reactor core at this time. The DCS Team is proposing to accomplish DOE's plutonium disposition effort using a partial MOX core with approximately 4 percent plutonium 239. DOE recognizes that European MOX programs use different enrichment levels and reactor–grade plutonium. If any specific safety limits or restrictions on the proposed enrichment level are required, they would be identified by NRC during the license amendment process.

FR004–3 **MOX RFP**

DCS has proposed a partial MOX core with approximately 40 percent MOX fuel. As discussed in response FR004–2, there is no NRC restriction on plutonium 239 levels at this time. Since DOE does not anticipate NRC restrictions which would significantly affect the proposed plutonium 239 levels or proposed MOX loading, DOE has not evaluated the cost and schedule implications of the commentor's suggestion. Should significant changes in the proposed plutonium 239 content be required by NRC, DOE would conduct additional NEPA, cost, and schedule analysis, as appropriate.

FR004–4 **Facility Accidents**

This comment is addressed in response FR004–2.

reactor operators to seek explicit license approval on this specific issue, besides other licensing issues. The DOE should factor in increased risks of reactor accidents for increases in plutonium-239 content beyond the typical European experience. The DOE should also provide a detailed analysis of the various scenarios it is proposing for the plutonium-239 content in reactor cores in the US disposition program relative to the European experience. This analysis should include details on what steps the DOE and its contractors plan to take to address safety issues if the plutonium-239 content of the MOX cores in the disposition programs is greater than has been the case in typical European experience. 4

6. Getting a disposition program in place in Russia is a central reason that has repeatedly been put forward to justify the MOX program in the United States. The use of MOX in Russian light water reactors is likely to have some US funding, since Russia insists that it will not carry out such a program without external funding. MOX use in Russia will also have non-proliferation consequences for the United States, especially given that, unlike the United States, Russia plans at some time in the future to reprocess MOX spent fuel. Further, some of the radioactive fallout from a severe accident in a Russian reactor using MOX, should one occur, may affect the Untied States, as did the fallout from the Chernobyl. Therefore, the Supplemental EIS should analyze the environmental consequences of MOX use in Russia. 5

FR004

FR004–5 **Nonproliferation**

DOE acknowledges the commentor's concerns regarding the disposition of surplus Russian plutonium as MOX fuel, although programmatic and policy issues such as U.S. policies toward plutonium disposition in Russia are beyond the scope of this SPD EIS. The scope of this SPD EIS is focused on analysis of alternatives on whether and how much U.S. surplus plutonium should be used as MOX fuel, which technology should be used for immobilization, where to construct the proposed surplus plutonium disposition facilities that are needed, and where to perform lead assembly fabrication and testing.

Understanding the economic dilemma in Russia, the U.S. Congress has appropriated funding for a series of small-scale tests and demonstrations of plutonium disposition technologies jointly conducted by the United States and Russia. For fiscal year 1999 (starting October 1998), Congress further appropriated funding to assist Russia in design and construction of a plutonium conversion facility and a MOX fuel fabrication facility. This funding would not be expended until the presidents of both countries signed a new agreement. Although the amount appropriated by Congress is not sufficient to fund the entire Russian surplus plutonium disposition program, the United States is working with Russia and other nations to resolve this issue.

MARYLAND OFFICE OF PLANNING
LINDA C. JANEY
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MARYLAND *Office of Planning*

Parris N. Glendening
Governor

Ronald M. Kreitner
Director

May 10, 1999

Ms. Laura S. H. Holgate
Director
Office of Fissile Materials Disposition
U.S. Department of Energy
P.O. Box 23786
Washington, DC 20026-3786

STATE CLEARINGHOUSE REVIEW - SPECIAL

State Application Identifier: MD990505-0416
Project Description: Draft Environmental Impact Statement - Supplement to the Surplus Plutonium Disposition (See MD980727-0797): an analysis of commercial reactor sites in 10 states that are proposed to irradiate mixed oxide fuel
State Clearinghouse Contact: Bob Rosenbush

Dear Ms. Holgate:

This is to acknowledge receipt of the referenced project. By copy of this letter, we are providing copies of the project to appropriate agencies, and requesting that they contact your agency directly with any comments or concerns by June 01,1999, and that they forward a completed response form and any comments to the Clearinghouse. 1

Please complete the attached form and return it to the State Clearinghouse upon receipt of notification that the project has been approved or not approved.

The State Application Identifier Number must be placed on all documents and correspondence regarding this project.

Please be assured that after June 01,1999 all intergovernmental review requirements will have been met in accordance with the Maryland Intergovernmental Review and Coordination Process (COMAR 14.24.04).

Sincerely,

Linda C. Janey

Linda C. Janey, J.D.
Manager, Clearinghouse & Plan Review Unit

LCJ:BR:mds
Enclosure
(* indicates with attachments)
cc: *MDE - Steve Bieber, *DHCD - Lucinder Jones, *MDSP - Carl Banaszewski, *DNR - Ray Dintaman, *MDOT - Ronald Spalding, *MEMA - Ruth Mascari, *OPC - Mary Abrams, *OPM - Bob Rosenbush

301 West Preston Street • Baltimore, Maryland 21201-2365
State Clearinghouse: (410) 767-4490 Fax: 767-4480

MR001

MR001–1 **General SPD EIS and NEPA Process**

The *Supplement to the SPD Draft EIS* describes the potential environmental impacts of using MOX fuel in the six reactors selected in three States: Catawba Nuclear Station Units 1 and 2 in South Carolina, McGuire Nuclear Station Units 1 and 2 in North Carolina, and North Anna Power Station Units 1 and 2 in Virginia. The *Supplement* also describes other program changes made since the SPD Draft EIS was published.

DOE acknowledges the State's receipt of the *Supplement* and entry into the Maryland Intergovernmental Review and Coordination Process. DOE will submit the form provided upon publication of the ROD.

MARYLAND *Office of Planning*

Parris N. Glendening
Governor

Ronald M. Kreitner
Director

MEMORANDUM

Please complete this form and return it to the State Clearinghouse upon receipt of notification that the project has been approved or not approved by the approving authority.

TO: **Maryland State Clearinghouse**
Maryland Office of Planning
301 West Preston Street
Room 1104
Baltimore, MD 21201-2365

DATE: ____________________
(Please fill in the date form completed)

FROM: ______________________________
(Name of person completing this form.)

PHONE: (____)____________
(Area Code & Phone number)

RE: **State Application Identifier:** MD990505-0416
Project Description: Draft Environmental Impact Statement - Supplement to the Surplus Plutonium Disposition (See MD980727-0797): an analysis of commercial reactor sites in 10 states that are proposed to irradiate mixed oxide fuel

PROJECT APPROVAL

This project/plan was:

☐ Approved ☐ Approved with Modification ☐ Disapproved

Name of Approving Authority:	Date Approved:

FUNDING APPROVAL

The funding (if applicable) has been approved for the period of

____________________, 199____ to ____________________, 199____ as follows:

Federal:	Local:	State:	Other:
$	$	$	$

OTHER

☐ Further comment or explanation is attached

OPCH-1F

301 West Preston Street • Baltimore, Maryland 21201-2365
State Clearinghouse: (410) 767-4490 Fax: 767-4480

MR001

MARYLAND SAFE ENERGY COALITION
ROBIN MILLS
PAGE 1 OF 12

Comment on Supplement to the Surplus Plutonium Disposition Draft Environmental Impact Statement (DOE/EIS-0283-DS)

From: Robin Mills, Director of the Maryland Safe Energy Coalition
Mail: P.O.Box 33111, Baltimore, Maryland 21218
Phone: (410) 662-8483
Fax: (410) 235-5325
Residence: 1443 Gorsuch Ave., Baltimore, Maryland 21218
E-mail: rmills4@bcpl.net

To: Department of Energy, Office of Fissile Materials Disposition
c/o Supplement to the SPD EIS
P.O. Box 23786, Washington DC, 20026
Phone: 1-800-820-5156
Fax: 1-800-820-5156
E-mail: http://www.doe-md.com

Date: 28 June 1999

Dear Bureaucrats,

I request that the Supplement (DOE/EIS 0283-DS) be withdrawn and rewritten due to errors and omissions in the document which prevent the public from accurately assessing environmental risk. Details of those errors and omissions follow.

1. Earthquakes

The environmental synopsis section of the report, page 7, says "The frequency of an earthquake of this magnitude is estimated to be between 1 in 100,000 and 1 in 10,000,000 per year." No reference or supporting material is supplied to support this false claim. In fact, Charleston has suffered two devastating earthquakes since the city was founded in 1670. Charleston is approximately one hundred miles from the Svannah River site (SRS). Because both earthquakes occurred before modern methods for measurement were developed in 1903 or the Modified Mercalli Intensity Scale was developed (1931), the exact magnitude of these quakes is unknown. 1

1

MR012

MR012–1 **Facility Accidents**

The earthquake that damaged or destroyed the majority of structures in Charleston, South Carolina occurred on August 31, 1886, and measured 6.6 on the Richter scale. Sixty people lost their lives and property damage was estimated at 5 to 6 million dollars. Effects in the epicentral region included about 80 km (50 mi) of severely damaged railroad tracks and more than 1,300 km^2 (502 mi^2) of extensive cratering and fissuring. Structural damage was reported several hundred kilometers from Charleston (including central Alabama, central Ohio, eastern Kentucky, southern Virginia, and western West Virginia).

DOE Standards 1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (April 1994), and 1022-94, *Natural Phenomena Hazards Characterization Criteria* (Change 1, January 1996), discuss the need to assess construction design requirements against maximum historical earthquakes in a given region or in tectonically analogous regions. The proposed surplus plutonium disposition facilities would be designed against seismic loading associated with a return period of 2,000 years (Performance Category PC–3).

The commentor is incorrect in presuming an equivalence between earthquake magnitudes that may be considered historically significant and those that would collapse the proposed MOX facility. As discussed in Appendix K.1.5.1, Accident Scenario Consistency, the frequency of seismic-induced total building collapse is developed as a margin below the frequency of seismic event against which the facility would be designed and constructed. The design-basis performance goal is that occupant safety, continued operation, and hazard confinement is assured for earthquakes with an annual probability exceeding approximately 1.0×10^{-4} per year. The transition from this criteria to a condition of total facility collapse has been qualitatively estimated using expert judgement to span at least an order of magnitude in frequency, resulting in an upper-bound estimate of 1.0×10^{-5} per year for total facility collapse. Given the large uncertainties in seismic behavior at such high magnitudes, accommodation has been made for the reasonable possibility that the frequency of total collapse may be significantly lower, hence the 1.0×10^{-7} per year lower bound.

I offer two references. "Earthquakes" by George A. Eiby, 1980, LCCCN # 80-10786, by Publisher Van Nostrand Reinhold Co., New York City, page 166,

"Another part of the United States not usually considered liable to earthquakes is South Carolina, but Charleston was badly damaged in 1886. This shock was one of the first to be the subject of an extended geological report, and there are some excellent photographs." I add that on page 189 this book lists the earthquake as having occurred on August 31, 1886.

"Historic Charleston" by Shirley Abbott, 1988 published by Oxmoor House Inc., Birmingham, AL 35201, on page 17, says,

"Earthquakes have come with terrible regularity, the worst perhaps in 1812 and 1886;..." On page 9 this book lists the founding of Charleston as 1670.

Two major earthquakes in 329 years of recorded history in the area. This evidence seems to indicate what the risk of future earthquakes might be, an average of one major quake every 165 years. If the MOX facility is to operate for 25 years, then the risk should be 25 in 165 or about one chance in seven. The supplement states, "an earthquake of sufficient magnitude to collapse the MOX facility." No data or refence is supplied to support the contention that the risk is as stated, but the historical record indicates the frequency might be much higher than the supplement admits. 1

The supplements stated risk of 1/100,000 to 1/10 million per year should be stated in terms the public can understand, by multiplying by the estimated facility lifetime, 25 years (?). Thus, the risk stated could be as low as one in four thousand that the MOX facility will collapse from an earthquake.

The whole treatment of the risk from earthquakes in the supplement is inadequate, obscures the risk to the public, does not supply proof or refences for its ascertations, and must, in my opinion; be withdrawn and rewritten.

2

MR012

The commentor is correct in stating that, for an assumed 25-year facility lifetime, the risk could be as high as 1 in 4,000 using the above factors. However, the MOX facility is projected to operate between 10 and 15 years. Therefore, the lifetime risk would be between 1in 6,666 and 1 in 1 million. Per DOE NEPA guidance, frequencies are reported on a per year basis because the duration of one year is the basis most commonly used for comparing accident frequencies.

2. Omissions in Core Inventory Isotopic Ratios

The table K-2, on page K-3 in the Facility Accidents Appendix contains errors or omissions which do not allow the public to correctly assess the risk the proposed action requests.

The table lists Curium 244 ratio at .94, which is incorrect. The table correctly lists higher core inventories for all the transuranic elements, Pu 239, 240, 241, Am 241, and Curium 242. This makes sense as MOX, starting at 4 atomic mass units larger than uranium 235 fuel, and having a larger capture cross section (Pu 239 capture cross section = 269 barns where Uranium 235 capture cross section = 99 barns) would tend to form more large transuranic isotopes in the core inventory. For Curium 244 to be less abundant in MOX fuel as compared to uranium fuel would defy the laws of probability. I add, that the supplement supplies no reference for where this table K-2 came from or how it was determined, thus adding to the illegitamacy of its information.

This table is very important to understanding the safety of MOX fuel, and omissions in this table do not allow a correct assessment. The quantity of delayed neutrons produced by plutonium is much lower than the quantity produced by uranium fuel. This dearth of delayed neutrons would be apparent to the public if the core inventory ratios were made available for delayed neutron precursors (those isotopes that produce delayed neutrons). The primary sources of delayed neutrons are the isotopes of Bromine 87, 88, 89, 90 and 91 and Iodine 137, 138, 139, 140 and 141. None of these isotopes is included in table K-2!. The DOE can not argue that the omission is due to the short half lives of these isotopes, because they list other isotopes of short half life, and these particular isotopes are crutial to reactor safety. Their omission invalidates the whole report in my opinion.

I even suggest that failure to include the Bromine isotopes might have been done on purpose because the results might throw the whole safety of the MOX program into jeopardy. 2

(3)

MR012

MR012–2 **Facility Accidents**

The curium 244 inventories shown in Appendix K were extracted from the output for the ORNL Isotope Generation and Depletion Code (ORIGEN) cases. Because the rate of curium 244 production is strongly dependent on burnup, it has a higher inventory level in LEU assemblies that are left in the reactor for three cycles than MOX assemblies that are left in the reactor for a maximum of two cycles. As a result, at the end of a cycle the ratio of curium 244 in a 40 percent MOX core would be about 6 percent lower than the ratio of curium 244 in a LEU core because more of the LEU core would be made up of assemblies that have been used for three cycles (33 percent of the core versus 20 percent of the core for the proposed MOX core).

It is true that burnups of 40 GWD/t or more result in higher fission gas production than LEU fuel at the same burnup. However, this does not automatically result in higher doses from reactors operating with MOX fuel. MOX fuel assemblies are engineered to accommodate this additional gas. In the event of a leaker, the gas is released into the reactor coolant and scrubbed through a series of filters that capture nearly all of the radionuclides so that any impact on dose would be expected to be small. Appropriate MOX fuel burnup limits will be established in concert with the NRC following a thorough safety review. It should be noted that reactors in Belgium and Germany typically use MOX fuel to burnups between 45 and 50 GWD/t and that while current French burnup limits are lower than that, French burnup limits for LEU fuel are also lower than those for U.S. reactors.

This SPD EIS analyzes offsite consequences and risks in terms of LCFs and/or prompt fatalities. Previous studies have determined that certain radioisotopes are primary contributors to offsite consequences due to their effects on humans and the environment. These radioisotopes are included in Table K–27. Radioisotopes bromine 87 through bromine 91 and iodine 137 through iodine 141 are not included in Table K–27 because they are not significant contributors to offsite consequences. Bromine 87 through bromine 91 and iodine 137 through iodine 141 are delayed neutron precursors with half-lives of less than 1 minute. They were included along with the hundreds of other isotopes in the ORIGEN analysis done to support this SPD EIS.

I reference Chart of the Isotopes by Knolls Atomic Power Laboratory, 13th edition July 1983. This chart shows the relative abundance of isotopes of particular atomic weight resulting from both the fission of uranium 235 and plutonium 239. From that chart,

	U-235 fission prod.	Pu-239 fission prod.	ratio
Percent w 87 amu	2.56%	.99%	.38
Percent w 88 amu	3.63%	1.36%	.37
Percent w 89 amu	4.88%	1.71%	.35

Because the plutonium 239 atom is 4 atomic mass units (amu) larger than uranium 235, the average fission products are also larger. In fact, that smaller of the two usual fission products from plutonium 239 is on average 5 amu larger than the smaller of the two fission products from uranium 235 fission. This results in a much smaller production of bromine isotopes which produce delayed neutrons.

The Knolls Atomic Power Lab chart referenced above does not give the amount of Bromine delayed neutron precursors, but only gives the abundance of all isotopes of that particular weight. The failure of table K-2 is that a more accurate assessment of the reduction of delayed neutrons is made impossible by the exclusion of crutial information from the table.

Another omission from the table is of even more significance. Tritium production is excluded. And any assessment of total fission product gas production is also totally absent from the supplement. Page 11 of the Environmental Synopsis provided by the reactor owner and MOX vendors states that the annual dose to the public would be the same with LEU fuel and MOX fuel. I dispute that.

I reference Irradiation Behavior of UO_2/PuO_2 Fuel in Light Water Reactors by W. Goll, H.P. Fuchs, R. Manzel and F. Schlemmer appearing in Nuclear Technology, April 1993, page 29 and MOX Fuel Experience in French Power Plants by P. Blanpain, X. Thibault and M. Trotabas appearing in Proceedings of the 2

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Tritium is a significant contributor to offsite consequences. The MOX/LEU ratio for tritium was calculated to be 0.95. Since this value is lower for the MOX core than an LEU core, the current analysis is conservative with respect to tritium.

Xenon 135, the most important reactor poison, with a thermal absorption cross-section 60 times greater than samarium 149, is included in Table K–27. Samarium 149, a stable (nonradioactive) isotope, is not included because it is not a significant contributor to offsite consequences.

The assertion that “the radiation dose from normal operations to the surrounding population at the reactors is not expected to change” is supported by doses at the Electricité de France plants in France where the dose to the public has not increased since these plants started to use MOX fuel. While it is conventionally accepted that there are differences in fission product inventories and activation products between an LEU and MOX core during a fuel cycle, these differences would be small enough that essentially no dose differential could be observed to members of the public. It is necessary to recognize that even though the concentration of plutonium would be different in the two reactor cores during a given fuel cycle, the quantities of “key” radionuclides (i.e., radionuclides that typically account for the majority of public dose) released to the environment are expected to remain essentially the same; such radionuclides are: iodine 131, cobalt 60, cesium 137, and tritium.

NRC Regulatory Dose Limits to the Public (as established per 10 CFR 50, Appendix I) are based on derived annual values (e.g., 3 mrem/yr from liquid effluent); to show compliance with these values, the calculated reactor doses are presented in a parallel (i.e., annual) format. In support of this approach, site environmental effluent reports are also published on an annual basis and accordingly provide annual dose values associated with reactor operations.

1994 International Topic Meeting, Light Water Reactor Fuel Performance, page 718, both references which clearly point to a vastly greater fission product gas production from MOX fuel as compared to LEU fuel. If gas production is higher with MOX fuel, then the release of gas to the environment would also be higher, and thus the statement on page 11 of the vendor supplied information is incorrect and must be withdrawn and reassessed.

During the Chernobyl accident, the operators allowed reactor power to fall which increased the accumulation of reactor poisons. It was attempting to bring power back up, and overcome the poisons that caused the operators to withdraw control rods beyond design specifications, causing the accident. As such, it is of interest, 2
with reguard to reactor safety and accidents, to know the production of reactor poisons produced by MOX fuel as compared to uranium fuel. The table K-2 again fails to inform the public of the true situation, especially by excluding Samarium production. The public is unable to assess the risk, or to even coment on the differences, because of this omission.

In summary to objection #2, the supplement fails to include:

Delayed neutron precursors production omitted
Fission product gas production, especially omitting Tritium
Fission product poison production omitted
Curium 244 production incorrectly stated
Source for the Core Inventory Isotopic Ratios info not stated.

3. MOX Accident Frequency Data

On page 33 of the supplement the statement is made that, "Although it has been suggested that the frequency of these accidents would be higher with MOX fuel present, no empirical data is available to support this." It is my contention that 3
there is emirical data which DOE is overlooking, presenting a clear case of bias by the DOE officials.

I here list 12 specific aspects where MOX fuel Ilowers safety.

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MR012–3 **Facility Accidents**

The commentor makes a series of 12 statements that he uses to deduce that MOX fuel is less safe than LEU fuel. The specific comments are addressed as follows:

The commentor's first through fourth and seventh through tenth statements discuss physical parameters that are different between LEU and MOX fuels and/or plutonium 239 and uranium 235 nuclei. The stated differences are correct: MOX fuel melts at a slightly lower temperature than LEU; plutonium does not conduct heat as well as uranium; fission gas release from pellets to the plenum is greater for MOX than LEU, at least for higher burnups (beyond 35,000 MW-day/MTHM); control rod worths are reduced with MOX fuel; the moderator coefficients are different; the neutron spectra are different and the lifetimes differ; and MOX fuel decay power is greater than LEU fuel in the long term (i.e., well after reactor shutdown). All of these facts are known and are incorporated in nuclear design packages that have been used to design fuel for reactors that are operating in Europe.

The fifth statement relates to power peaking. Power peaking can be an issue in partial MOX cores because of the neutron flux gradient between LEU and MOX assemblies. As noted by the commentor, the peaking issues in partial MOX cores are resolved by increasing the enrichment of uranium 235 at the edge of LEU assemblies that are adjacent to MOX assemblies and by decreasing the plutonium concentration at the edge of MOX fuel assemblies that are adjacent to LEU assemblies. These changes mitigate the flux gradient that would otherwise exist between adjacent LEU and MOX assemblies. DCS has proposed using graded enrichment fuel for the MOX assemblies only. The enrichment will vary by fuel rod within an assembly, not within individual fuel rods. DOE does not agree that this solution introduces opportunity for errors that would lead to an increase in accident risk.

The sixth statement relates to the degree of mixing of plutonium and uranium in MOX fuel. Whereas LEU fuel is inherently homogeneous on a microscopic scale, MOX fuel is not. However, the degree of mixing that is required need only ensure that plutonium islands in the MOX fuel are sufficiently small that adequate heat rejection to the rest of the pellet may ensue. The Micronized

1.) Lower melting point.

The Plutonium Handbook, by O.J. Wick, editor, 1980 by the American Nuclear Society states on page 263, section (c)(1), "Melting Behavior. The melting point of UO_2 has been reported many times in the literature and values ranging from less than 2700 C to about 2825 C can be found. At Hanford a value of 2730 $\pm$ 30 C has been consistently observed for UO_2. Only four melting points have been reported for PuO_2 - 2240 C, 2295 C, 2280 C, and 2400 C."

This is empirical data showing plutonium oxide has a lower melting point as compared to uranium oxide. This lower melting point does have an effect on safety, as a meltdown will occur at lower temperatures with fuel containing plutonium. When mixed with UO_2, the melting point of the mixture should exhibit a melting point somewhere between the two elements, which means, the melting point of MOX fuel will always be lower than the melting point of LEU fuel. This is a reduction in safety margin, and there is adequate empirical data available to prove this point.

Furthermore, this lower melting point is impacted by other adverse safety features of MOX fuel, such as corrosion attack on the cladding by plutonium at high temperatures, increased fission product gas production and power peaking at the MOX fuel boundaries, which taken together greatly increase the risk of release of plutonium and fision products into the coolant.

2.) Lower heat conductivity.

The Reactor Handbook, section Plutonium and Its Alloys C.R. Tipton editor, Volume 1, 2nd edition by Interscience Pub., 1960, New York, pages 280-1 found that the thermal conductivity of plutonium-uranium alloys was somewhat lower than that found for pure uranium. If so, and there is other evidence available to support this ascertation, then the temperature inside the MOX fuel rods will be higher than in the LEU fuel rods, as the transfer of heat will be slower. In concert with the increase

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Master (MIMAS) fuel fabrication process assures a well-mixed inventory of plutonium and uranium on a scale that precludes islands of plutonium particles in the uranium matrix from exceeding established size limits. The mixing operations in the MIMAS process ensure adequate mixing of the oxides; in fact, the MIMAS process was developed commercially in Europe with exactly this issue in mind.

In relation to the eleventh statement, worker exposure will increase marginally as reported in this SPD EIS. The increased dose, which is small and still well within NRC requirements, would result from handling and inspecting the fresh MOX fuel assemblies which are inherently more radioactive than fresh LEU fuel assemblies.

As to the commentor's concern about reactor vessel embrittlement, analyses performed for DOE indicated that the core average fast flux in a partial MOX fuel core is comparable to (within 3 percent of) the core average fast flux for a uranium fuel core. All of the mission reactors have a comprehensive program of reactor vessel analysis and surveillance in place to ensure that NRC reactor vessel safety limits are not exceeded.

The twelfth statement is an attempt to roll the previous statements together and conclude MOX fuel is not safe. The commentor mistakes design constraints and challenges for using MOX fuel as indicators of inherent decrements in safety. All of the differences between the two fuel types can be accommodated by proper engineering without any significant decrement in safety. Rigorous safety analyses and operational parameter assessments would be conducted, and a license amendment approved by NRC, prior to the use of MOX fuel in any U.S. reactor.

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in fission product gas production, the creation of a gas gap between the fuel and cladding combined with lower heat conductivity leads to a much larger risk for localized fuel failure and melting.

3.) Higher fission gas production

Increased gas production threatens safety in at least three separate ways. The gas threatens the creation of a heat insulating gas gap between the fuel and cladding causing localized fuel melting, the gas creates pressure inside the fuel rods threatening cladding failure from bursting, and the gas threatens increased radioactive gas releases to the environment leading to an increase in local population exposures. The failure of DOE to admit to a doubling of Tritium production in MOX fuel, increased production of other gasses especially at higher burnups, and the threat this situation poses, should be a scandle.

The Plutonium Handbook (ibid) section on the Irradiation Behavior of UO_2-PuO_2 (section 20-3.2, pages 664-665) part (b) last sentence states, "All the irradiation specimens with the exception of two had a fission gas plenum to prevent excessive internal gas pressures at the high burnups." I quote this to point out that nuclear engineers have known about the fission gas production problem of plutonium fuels for a long time.

4.) Control Rods and Boron Worth Reduction

Both uranium and plutonium can either fission or absorb neutrons. The likelyhood that either will occur is expressed by the unit barns, which technically is 10^{-28} meters squared, or also 10^{-24} centimeters squared, or a cross sectional area measuring a trillionth of a centimeter squared. Both uranium and plutonium have cross sections for both fission and for capture. It turns out that plutonium is much more likely to absorb neutrons in the thermal energy region than uranium, or more precisely, the cross section for capture is 99 barns for uranium 235 and 269 barns for plutonium 239.

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Because plutonium absorbs so many thermal neutrons, the average energy (speed) of the remaining neutrons is higher (faster). The control rods are not as effective with faster neutrons, thus there is reduced control rod worth. There is also reduced boron worth. Boron is often added to the reactor water to help control the reactor. (called a shim) As a result, it has been decided to add additional control rods to reactors using MOX fuel.

A reduction in control rod effectiveness is empirically proveable and it definitely has an effect on reactor safety. This aspect is so important that it has already been decided to increase the number of control rods in MOX fueled reactors. The supplement should state that there is indeed a safety problem, and should state what exactly the DOE plans to do to reduce this safety hazard. It is my contention that even with additional control rods, the reduction of control rod and boron worth will make MOX fueled reactors inherently less safe.

5.) Power Peaking Problems

Due to intense absorbtion of thermal neutrons by plutonium, there is a tendency that an irregular power distribution results inside the core, producing a large power peak at the water-MOX fuel interface. This effect of Fick's Law can be stated that the rate of flow of the solute is proportional to the negative gradient of the solute concentration. In simply terms, because plutonium absorbs so many neutrons, there is a flow from uranium elements towards MOX elements (of neutrons) creating higher power levels around the MOX fuel elements.

I do not argue that this problem is unsolvable, but rather that solving this problem introduces a factor into the MOX fuel calculation which increases the risk of an accident. The solution is to create zones within each fuel rods which have differing grades of plutonium concentration to offset the power peaking problem. The complexity of this solution introduces the possibility of errors in fuel construction, labeling, shipping and loading.

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6.) Stoichiometry of MOX Fuel

The Plutonium Handbook (ibid) in the section on UO_2-PuO_2 fuels states on page 665, "Uniform solid solution assures a short heat transfer time constant so that the negative Doppler effect of U-238 can offset the positive effect of Pu-239." This is evidence that Pu-239 has a positive Doppler effect. The Doppler effect is the fuel temperature coefficient of reactivity, and is also sometimes called the prompt temperature coefficient. The Nuclear Regulatory Commission requires that the overall temperature coefficient be negative. The consequences of a positive coefficient are dire. If a coefficient is positive, then an increase in temperature causes an increase in reactivity which in turn increases temperature, producing a positive feedback loop that could cause rapid reactor dissassembly. By NRC requirements the combined temperature coefficients must be negative so that an increase in temperature causes a decrease in power thus limiting potentially dangerous transients.

The above evidence quoted is that Plutonium 239 has a positive Doppler coefficient. This can be compensated for by properly mixing the plutonium oxide with uranium 238 oxide. According to the literature, grains of plutonium larger than about ten microns will cause Doppler coefficient problems. The problem is, an increase in temperature leading to an increase in reactivity. This is a safety problem.

The problem is stated, the evidence is clear, there is a solution, but there is an increased risk that a batch of MOX fuel won't be properly mixed. The word stoichiometry refers to whether a solution is completely uniform in mixture. MOX fuel must be.

7.) Moderator Coefficient

Nuclear Reactor Engineering by S. Glasstone and A. Sesonske, 1994 Pub. by Chapman & Hall, says on page 280, section 5.103, "Hence, there will be a tendency for the initial negative contribution to df/dT (from uranium-235) to become positive (from plutonium-239)." In english that means trouble.

8.) Decay Heat

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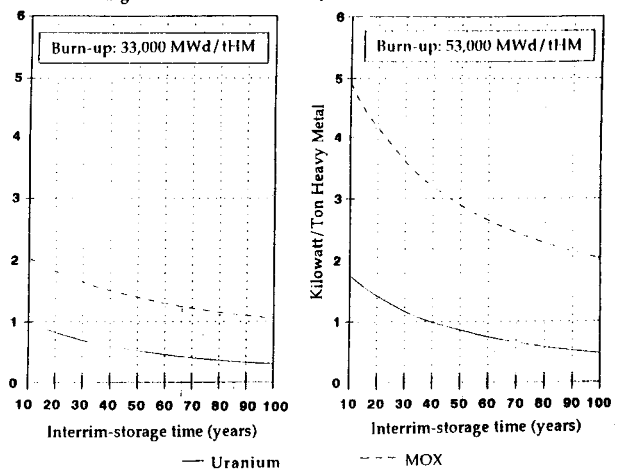
I reference the International MOX Assessment report entitled the Comprehensive Social Impact Assessment of MOX Use In Light Water Reactors by J. Takagi et.al., 1997 by Pub. Citizens Nuclear Information Center, Tokyo, Japan, page 190 shows the following table for decay heat generation is presented:

Fig. 5-2 Heat Generation of Spent UO_2 and MOX Fuel



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Higher heat generation means MOX fuel must be stored in the cooling ponds longer and will generate more heat in a repository. I add that higher fissile material concentrations in spent MOX fuel will also be higher creating a greater criticality danger.

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9.) Delayed Neutrons

Nuclear Reactor Engineering (ibid) page 110 puts the fraction delayed at Uranium 235 = .0065% versus plutonium 239 = .0020%. Uranium fission produces over three times as many delayed neutrons. Delayed neutrons control the reactor period, the speed with which changes in power can be made. A reactor with only prompt neutrons could not be controlled the reactor period would be too short, a matter of milliseconds. The reduction from MOX fuel causes the DOE and other countries to rely on only one third MOX reactor cores. Thus, there has already been some concession that this is a problem.

The reduction of delayed neutrons means that one third MOX cores will always have fewer delayed neutrons, by several percent. This difference is not explored in any way in the supplement and this difference would tend to make the distance to an accident closer.

10.) Prompt Neutron Lifetime

The faster neutrons in MOX fuel already explained in #4.) have another effect. The average time it takes for a neutron to be emitted until it is absorbed or causes fission is the prompt neutron lifetime, typically about 24 millionths of a second for uranium fuel. The omission of the reduced safety margin from a shorter neutron lifetime should be included in the supplement. I say the increase in generations per second will be from about 41,000 generations per second of prompt neutrons to 49,000 generations per second for MOX fuel, an estimated 18% increase in generations per second. This will decrease reaction times slightly during transients, thereby decreasing the safety margin to an accident.

11.) Embrittlement and Exposures

Faster neutrons travel through more shielding. The supplement fails to account for the increased exposure to workers and increases in neutron embrittlement to reactor components.

12.) The Synergy Effect

Just one of the preceeding problems might not cause an accident, or significantly increase "the frequency of these accidents", but together:

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<u>Summary of the ways MOX fuel is less safe in reactors</u>

1. Plutonium has a lower melting point.
2. Plutonium does not conduct heat as well.
3. Fission product gas production is higher.
4. Control rod and boron worth is reduced.
5. Power peaking is more difficult to control.
6. Mixture of the fuel must be perfect.
7. The much different moderator coefficient is troublesome.
8. Decay heat production complicates shutdowns and disposal.
9. Delayed neutron reduction reduces safety margin.
10. More prompt neutron lifetimes reduces the safety margin.
11. Worker exposure increases and reactor embrittlement increase.
12. Taken together there is a preponderance of evidence that MOX fuel might not be as safe as uranium fuel.

I therefore challenge the catagorical statement made on page 33 of the supplement that, "there is no empirical data available to support this." I have presented several expert sources of the subject to show that there are concerns about these problems among experts. 3

One aspect of the plutonium disposition process that can not be brought before experts is superstition, the thirteenth reason MOX is less safe. Plutonium is named after the god of the underworld Pluto, an object of fear and death. I fear that the greed of the nuclear industry will cause a huge catastrophe if they proceed. Mixing profit motive with plutonium <u>is</u> unlucky. I'm not afraid to use any arguement that happens to favor my position.

To summarize my main points about the supplement, the risk of earthquakes is lacking, the table of fission product ratios is lacking, and the catagorical statement about accident frequency needs to be reexamined.

Robin Mills

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MILLS, ROBIN
PAGE 1 OF 1

Question/ Information Request Card

Name: ROBIN MILLS
Address: 1443 GORSUCH AVE.
B-MORE, MD 21218
Phone: (410) 662-8483 Fax: (410) 235-5325
E-mail: rmills4@bcpl.net

Question/ Request: Charleston, S.C. was destroyed by earthquake in 18??. Please provide info. on date, strength, damage and est. frequency of S.C. earthquakes. 1

For further information contact:
U.S. Department of Energy, Office of Fissile Materials Disposition, MD-4
Forrestal Building, 1000 Independence Ave., SW, Washington, D.C. 20585
1-800-820-5156

DCR002

DCR002–1 **Geology and Soils**

The earthquake that damaged or destroyed the majority of structures in Charleston, South Carolina occurred on August 31, 1886, and measured 6.6 on the Richter scale. Sixty people lost their lives and property damage was estimated at 5 to 6 million dollars. Effects in the epicentral region included about 80 km (50 mi) of severely damaged railroad tracks and more than 1,300 km^2 (502 mi^2) of extensive cratering and fissuring. Structural damage was reported several hundred kilometers from Charleston (including central Alabama, central Ohio, eastern Kentucky, southern Virginia, and western West Virginia).

DOE Standards 1020-94, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities* (April 1994), and 1022-94, *Natural Phenomena Hazards Characterization Criteria* (Change 1, January 1996), discuss the need to assess construction design requirements against maximum historical earthquakes in a given region or in tectonically analogous regions. The proposed surplus plutonium disposition facilities would be designed against seismic loading associated with a return period of 2,000 years (Performance Category PC–3). In addition, there is a deterministic element to the process which also requires evaluation against maximum historical events. Other new facilities at SRS have been assessed against the Charleston earthquake for design adequacy and the proposed facilities at SRS would undergo the same assessment.

Question/ Information Request Card

Name: ROBIN MILLS

Address: 1443 GORSUCH AVE
BALTIMORE, MD. 21218

Phone: (410)662-8483 Fax: (410)235-5325

E-mail: rmills4@bcpl.net

Question/ Request: Fuel temperature coefficient of reactivity response curve for Pu 239 versus U-235 fuels. This is my 2nd request for this info. 1

For further information contact:
U.S. Department of Energy, Office of Fissile Materials Disposition, MD-4
Forrestal Building, 1000 Independence Ave., SW, Washington, D.C. 20585
1-800-820-5156

DCR001

DCR001–1 **MOX Approach**

Initial evaluations indicate that partial MOX fuel cores have a more negative fuel Doppler coefficient at hot zero power and hot full power, relative to LEU fuel cores for all times during the full cycle. These evaluations also indicate that partial MOX cores have a more negative moderator coefficient at hot zero power and hot full power, relative to LEU fuel cores for all times during the full cycle. These more negative temperature coefficients would act to shut the reactor down more rapidly during a heatup transient.

STEVENS, BARBARA
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Public Statement:) BARBARA STEVENS + P.O. BOX 85
46 Aldridge Rd Chimayo, NM 87522
Greenbelt MD 20770

(1) One of the reactors that would use MOX is close to Washington DC area
I am concerned that this is a complete experiment. Bomb plutonium has never been used for reactor fuel before.
I am not willing to take the risk. 1

~~MOX~~ ~~are~~ mat making MOX fuel would result in more process waste that would likely go to WIPP, immobilization could make less process waste than MOX.
I live part of the year in New Mexico where I am a property owner. I oppose WIPP + I oppose all new plutonium waste generation. 2

page 1 of 3
Barbara Stevens
June 15, 1999

DCR006

DCR006–1 **MOX Approach**

The fabrication of MOX fuel and its use in commercial reactors has been accomplished in Western Europe. This experience would be used for disposition of the U.S. surplus plutonium. The environmental, safety and health consequences of the MOX approach at the proposed reactors are addressed in Section 4.28. In addition, NRC would evaluate license applications and monitor the operations of both the MOX facility and domestic, commercial reactors selected to use MOX fuel, to ensure adequate margins of safety.

DCR006–2 **Waste Management**

DOE acknowledges the commentor's opposition to WIPP and all generation of new plutonium waste. Only TRU wastes generated by the proposed surplus plutonium disposition facilities would be shipped to WIPP. DOE alternatives for TRU waste management are evaluated in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F, May 1997) and the *WIPP Disposal Phase Final Supplemental EIS* (DOE/EIS-0026-S-2, September 1997). As described in Appendix F.8.1, and the Waste Management sections of Chapter 4, it is conservatively assumed that TRU waste would be stored at the candidate sites until 2016, at which time it would be shipped to WIPP in accordance with DOE's plans.

As described in Sections 2.18.3 and 4.28.2.8, additional spent fuel would be produced by using MOX fuel instead of LEU fuel in domestic, commercial reactors. Spent fuel management at the proposed reactor sites is not expected to change dramatically due to the substitution of MOX assemblies for some of the LEU assemblies. Likewise, the additional spent fuel would be a very small fraction of the total that would be managed at the potential geologic repository.

This SPD EIS assumes, for the purposes of analysis, that Yucca Mountain, Nevada, would be the final disposal site for all immobilized plutonium and MOX spent fuel. As directed by the U.S. Congress through the NWPA, as amended, Yucca Mountain is the only candidate site currently being

(2)

AN OBSERVATION – that touches on The Impact statement – in a obscure but perhaps real Way – MOX → Extra WASTE –

Just when WIPP was opened Last month –
Sychronized with its opening –
A LARGE AD campaign blossomed
for the Nuclear Power Industry.

AT The Time WIPP opened (illegally – Some think) There was a NM State Permit – Hearing to open WIPP – was underWAY
AND has Not yet been Completed – GAO ~~is~~ 3
has yet to ~~Still~~ review ~~ing~~ – it AS we speak.
AT THAT Hearing – The undisputed INFORMATION
That the Radioactivity going into WIPP – Will
At some point surface in the Pecos River,
Rio GRANDE + Gulf of Mexico.
THEREFORE: To – TAKE THE MOX solution ~~to produce~~ produce more radiative waste ~~than necessary~~
IN ORDER to Dispose of the surplus Plutonium
THAN absolutely Necessary – (SINCE the waste can Not actually be contained) – and to do this to ~~further~~
IN FACT JUST give a boon to the Nuclear power Industry – and further MASK its TRUE COST – ~~IS~~ MAKES MOX UNACCEPTABLE to anyone ~~interested~~ CONCERNED with The ENVIRONMENT.

Thank You; Barbara Stevens June 15/99

DCR006

characterized as a potential geologic repository for HLW and spent fuel. DOE has prepared a separate EIS, *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250D, July 1999), which analyzes the environmental impacts from construction, operation and monitoring, related transportation, and eventual closure of a potential geologic repository. The immobilized plutonium and MOX spent fuel are included in the inventory analyzed in that draft EIS.

DCR006–3 **Waste Management**

DOE acknowledges the commentor's concern regarding contamination of water resources in the vicinity of WIPP, although this issue is beyond the scope of this SPD EIS.

Use of MOX fuel in domestic, commercial reactors is not proposed in order to subsidize the commercial nuclear power industry. Rather, the purpose of this proposed action is to safely and securely disposition surplus plutonium by meeting the Spent Fuel Standard. The Spent Fuel Standard, as identified by NAS and modified by DOE, is to make the surplus weapons-usable plutonium as inaccessible and unattractive for weapons use as the much larger and growing quantity of plutonium that exists in spent nuclear fuel from commercial power reactors. The MOX facility would produce nuclear fuel that would displace LEU fuel that utilities would have otherwise purchased. If the effective value of the MOX fuel exceeds the cost of the LEU fuel that it displaced, then the contract provides that money would be paid back to the U.S. Government by DCS based on a formula included in the DCS contract.

The remainder of this comment is addressed in response DCR006–2.

STEVENS, BARBARA
PAGE 3 OF 3

Thankyou for considering
my Comments & the Questions
they raise ~~[illegible]~~

Barbara Stevens
June 15, 199

DCR006